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GEOGRAPHICAL WORK IN CANADA, 1894.

BY

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The government organization in Canada most immediately connected with the mapping of the country as a whole is the Dominion Lands Survey, its field of operations being the Northwest Territory with Manitoba, the "railway belt" in British Columbia, and generally all parts of the Dominion not included in the several older provinces.

The main object of this survey, as its title implies, has been the blocking out and subdivision of the public lands of the Dominion, but extended exploratory surveys have also been carried out, as well as, in late years, topographical surveys in the Rocky Mountain region. In 1894 a new departure has been made in the direction of irrigation surveys, including accurate lines of levelling and the gauging of rivers and streams. These surveys are intended eventually to include a large tract of south-western Alberta, embracing the foot-hills of the Rocky Mountains, and a considerable width of the adjacent plains, where the rainfall is in many years insufficient for the proper growth of crops, although the soil and other conditions are of the most favourable. This work is being carried out under Mr. J. S. Dennis. The general plan pursued is, to cover the country by a primary net-work of levelled lines following the main lines of the land surveys, and establishing permanent points of reference at township corners, river crossings and other convenient places. In this way a satisfactory basis, and one referred to a common datum, will be laid down, to which all local irrigation surveys may be attached.

In 1894 the Hydrographic Survey of the Canadian portion of the Great Lakes was continued by Mr. W. J. Stewart, under the Department of Marine, and the work in Georgian Bay and the "North Channel" of Lake Huron was completed. One additional chart, based on this work and published by the British Admiralty, has been issued, and it is hoped soon to issue a complete chart of the "North Channel." Also under the Department of Marine is the Tidal and Current Survey which is now being actively prosecuted on the Atlantic Coast by Mr. W. B. Dawson.

Surveys of the region traversed by the Canada-Alaska boundary were continued during the summer of 1894 under Mr. W. F. King and Professor T. C. Mendenhall, Commissioners appointed for that purpose by the Governments of Great Britain and the United States respectively. The delineation of the country through which this line is to be defined, may now be considered as almost completed, from the southern extremity of the line to the point at which it reaches the 141st Meridian. Seven Canadian parties were in the field, under the general superintendence of Messrs. Wm. Ogilvie and O. Klotz. The photo-topographical method has been throughout employed successfully in these surveys, and by its means nearly 10,000 square miles of rough and inaccessible mountain country have been laid down during the past season by the Canadian contingent.

Although secondary to its main objects, a more or less considerable amount of geographical work is necessarily undertaken each year by the Geological Survey of Canada. The field of operations of this survey extends to all parts of the Dominion, including the various provinces as well as the unorganized territories. Even in the older provinces it is usually found requisite to add much to the existing maps in order to render them suitable as a basis for the representation of the geological features; while in the more remote districts through which lines of exploration are carried, it is often necessary to devote as much time to geographical as to geological work, the rivers, lakes and astronomical positions being laid down and determined for the first time. In either case, both classes of work have as a rule been undertaken and carried out concurrently, either by the geologist himself or under his immediate supervision.

In 1894 the more important exploratory surveys in Canada, from a geographical point of view, have been two conducted by the Geological Survey, and of these it is proposed to give a few more detailed notes.

In 1893, Mr. J. B. Tyrrell, of the Geological Survey, carried a reconnaissance survey from the east end of Athabasca Lake across the "Barren Lands" to the head of Chesterfield Inlet, returning along the west coast of Hudson Bay. The most detailed account of this interesting journey which has yet been published appears in the November (1894) number of the *Geographical Journal* (London). In 1894 the same gentleman was commissioned to examine and survey a second line through the great region to the west of Hudson Bay. In this expedition he was accompanied by Mr. R. Munroe Ferguson, the party consisting besides of four men, with

two canoes. The unexplored country was this time entered from the north end of Reindeer Lake, of which the waters are tributary to the Churchill River. Under the guidance of two local Indians, Ice River was followed up for seven days, to a portage route which led through Thanout and Theitagá Lakes, to a lake at the head of Kazan or White Partridge River, in north latitude $60^{\circ} 10'$. From the head of Reindeer Lake to this point, no less than fifty-three portages had to be made, with an aggregate length of more than fifteen miles.

The Kazan River was then descended for a short distance, to Ennaida Lake, on the edge of the "Barren Lands," where the Indian guides turned back, having no knowledge of the country beyond. The river still maintained its northward course, however, and after some time a camp of Eskimos was fallen in with, and two men were again procured as guides, thus relieving the party of any uncertainty as to the route. For two weeks the river was followed down and surveyed, and the western shore of the large Yath-kyed Lake, through which it flows, was also examined.

Although far inland, numerous camps of Eskimos were passed during this part of the journey, these people here living entirely upon the cariboo and seldom visiting the coast.

When in latitude $63^{\circ} 7'$ it was definitely ascertained that the Kazan River flows into the head of Chesterfield Inlet, but that by means of a series of long portages another river might be reached which enters Hudson Bay much further south. Various considerations, including the lateness of the season, appeared to Mr. Tyrrell to render the last-named route preferable, and with the help of seven Eskimos the canoes and outfit were conveyed across these portages, and the shore of the bay was reached on September 18th, in about latitude 62° . Favoured by good weather, the party then proceeded southward along the west shore of the bay, and attained Fort Churchill on October 1st. From this place, after waiting for the full onset of winter, the return was made overland and along the ice of Lake Winnipeg to Winnipeg City. As a result of Mr. Tyrrell's work in this region in 1893 and 1894, it will now be possible to revise the geographical outlines of the great system of lakes and rivers of the "Barren Lands," which on all previous maps has appeared in the vaguest possible manner, after Hearne, who wandered through this country in search of the Coppermine River more than a hundred years ago. We are also now furnished with the main geological features of this tract of country, which is found to include, besides the Archæan rocks, a large area of Lower Cambrian.

A second important exploration, also carried out under the auspices of the Geological Survey, is that of the interior of the Labrador Peninsula by Mr. A. P. Low, assisted by Mr. D. I. V. Eaton. In 1893, Mr. Low had crossed from Mistassini Lake to the upper part of the Koksoak or Ungava River, which was followed down and surveyed to its mouth in Ungava Bay. It had been intended to spend the winter here, but the scarcity of provisions led Mr. Low to embrace the opportunity of a passage by the Hudson Bay Company's steamer to Hamilton Inlet, on the east coast of Labrador, and the company's post at the head of this long inlet was adopted as a base for further work. In order that surveying operations in the interior might be carried on successfully during the ensuing summer, it was necessary beforehand to establish a dépôt of provisions as far inland as possible. Before the Hamilton River closed in the autumn, four Indians were sent up with loaded canoes to establish a cache. They reached a point about 100 miles from the coast, returning afterwards on the ice. In January Mr. Eaton and a party of men with sleds established a second cache about seventy miles up the river, and on March 6th a final start was made. Till May 19th, the party was continuously engaged in the arduous work of carrying on the supplies and outfit, which were thus advanced to a point on the plateau of the interior of peninsula above the Grand Falls. A continuous survey of the route had also been made to this point, where, after a delay of ten days, during which the ice broke up on the lakes and rivers, the exploration by water began.

The Grand Falls, it will be remembered, were visited by Messrs. Bryant and Kenaston and by the Bowdoin College party in 1891, being the terminal point of both these expeditions. Mr. Low writes: "These falls are probably the highest and grandest in America. The river here rivals the Ottawa in volume, and has a total fall of eight hundred feet in eight miles, with one sheer drop of three hundred feet where it descends from the table-land into a narrow cañon, with perpendicular rocky walls, through which it rushes for five or six miles, until it runs out into the wider and older valley."

On reaching Sandy Lake, where the south and west branches of the Hamilton unite, it was decided to employ this as a centre from which to carry on the work, and here the greater part of the stores were cached. The west or Ashounipi Branch with numerous connected lakes, was first examined; after which, again starting from Sandy Lake, a trip was made to Michikamow Lake, from which the

Northwest River flows. It was found to be about the same size as Lake Mistassini, but almost free from islands.

After returning to Sandy Lake, this place was finally left on August 1st. The route followed was by the south or Attikonok Branch of the Hamilton, to its head in a lake of the same name. Thence across the height of land to the Romaine River, which was descended nearly 200 miles, when a portage route was followed westward to the St. John River, by which the shore of the Gulf of St. Lawrence was eventually reached not far from Mingan.

The results of Mr. Low's work in 1893 and 1894 include the survey of over 2,000 miles of rivers and lakes in the interior of the Labrador Peninsula, combined with a geological examination of all the routes traversed. While, as heretofore supposed, the region as a whole is characterized by Archæan rocks, a very important area of Lower Cambrian, with a probable length of 500 miles, has been discovered and in part outlined. These rocks are rich in ores of iron. Observations of much importance in relation to the glacial period have also been obtained.

Although carried out in 1893, mention may in conclusion be made of an interesting piece of exploration in the Rocky Mountains by Professor A. P. Coleman, of which a short account and map have lately appeared.* This was directed to the sources of the North Saskatchewan and Athabasca Rivers, with the special object of visiting Mounts Brown and Hooker, which have for many years been credited with being the highest summits of the Rockies. Professor Coleman states that the position assigned to Mount Brown on the maps is occupied by a comparatively insignificant mountain of about 9,000 feet in height. It proved somewhat difficult to recognize Mount Hooker, but in the vicinity in which it is indicated there are several summits estimated at from 11,000 to 13,000 feet in height.

* The Geographical Journal, London, Volume V, No. 1.